TARIFF PROTECTION AND TAXATION OF FOREIGN CAPITAL: A COMPARISON BETWEEN THE H-O-S MODEL AND THE SPECIFIC FACTOR MODEL

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1. Introduction

Protection and welfare are the most important concerns to many national economies which face to the international market forces.[1] These two problems may be very severe especially in developing countries. In such countries they have at least one more important problem expected to be solved, that is, how to introduce enough *capital* to develop their countries in the case of resource poor countries, or how to introduce enough *labour* in the case of resource (especially oil) rich countries.[2] Thus we have three policy targets: (1) to protect relevant industries, (2) to raise (or not to reduce) the host-country welfare and (3) to introduce the scarce factor more efficiently. In order to hit these targets, available tools are an import tariff and a tax on foreign profits or wages. These alternative policy instruments affect the goals in various ways. Then the purpose of this paper is to discuss the performance of such tools for the respective policy target using two types of international trade model with factor movement, that is, the standard Heckscher-Ohlin-Samuelson (H-O-S) model and the specific-factor model.

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1) Theoretically, this is discussed in numerous studies under the headings of 'trade and welfare' or 'the gain from trade'. For example, see Samuelson (1962), Kemp (1962), Bhagwati (1968) and so on.

2) The problem of capital inflow (or outflow), *per se*, is discussed by Johnson (1967), Bhagwati (1973), Hamada (1974), Brecher and Diaz Alejandro (1977), Martin (1977), Minabe (1981) and Yabuuchi (1982).

We discuss the case where *capital* is imported to the country for convenience. Needless to say, our arguments and results can be applicable to some of the mid-east countries which require many labour forces to develop and industrialize their countries.

2. The H-O-S model with capital inflow

Let us consider a small open economy which continues to import the capital intensive commodity while remaining incompletely specialized. We deploy throughout the analysis the model of international trade with capital inflow as in Bhagwati (1973), Brecher and Diaz Alejandro (1977), Martin (1977), Yabuuchi (1982) and others. Two primary factors produce two traded commodities: X_1, the exportable commodity, and X_2, the importable commodity. The two linearly homogeneous and quasi-concave production functions are

$$X_i = F^i(K_i, L_i), \qquad i = 1, 2,$$

where K_i and L_i are the capital and labour inputs utilized in the ith sector, respectively. Each production function has positive but diminishing marginal product of each factor.

According to the argument of capital inflow by Bhagwati (1973) or Corden (1974, ch.12), it is assumed that foreign investment is induced by a tariff change, i.e. capital influx is a function of the rental net of the tax on foreign capital:

$$K_F = \tilde{K}_F[(1 - \tau)r], \tag{1}$$

where τ is the *corporation tax* on foreign capital and r is the rental on a unit of capital. We assume that $\tilde{K}_F' = dK_F / d[(1 - \tau)r] > 0$.[3]

3) The implication of this assumption is that this country is not small in *capital* market. Alternatively, we can suppose that this economy is facing an upward-sloping foreign capital supply curve so that the foreign rental (r^*) rises as foreign capital flows in. This is possible even though the international commodity prices remain constant. One example would be that the number of factors in the foreign country is greater than the number of commodities.

Taking into account the existence of foreign capital (K_F), the production side of our economy is summarized as:

$$dX_1 + pdX_2 - rdK_F = 0, \tag{2}$$

where p is the domestic price of the importable commodity in terms of the exportable commodity.

Let U denote the social utility which a community derives from the consumption of the two commodities, with their demand denoted by D_i ($i = 1, 2$). Then,

$$U = U(D_1, D_2). \tag{3}$$

The balance of trade equilibrium requires that

$$D_1 + p^*D_2 = X_1 + p^*X_2 - (1 - \tau)rK_F, \tag{4}$$

where p^* is the given foreign price of the importable commodity in terms of the exportable commodity, and $p = (1 + t)p^*$ when a tariff of rate t is imposed on foreign imports.[4]

3. The policy which induces the same amount of capital inflow — The H-O-S model

Differentiating (4) and considering (2), we get:

$$\frac{dU}{U_1} = dD_1 + pdD_2$$

$$= tp^*dE_2 + \tau rdK_F - (1 - \tau)K_Fdr + rK_Fd\tau, \tag{5}$$

where $U_1 = \partial U/\partial D_1$ and $E_2 = D_2 - X_2$. We assume that $U_1 > 0$.

The excess demand for the importable commodity is expressed formally as:

4) For the details of our model, see Yabuuchi (1982).

$$E_2(p, K_F) = D_2(p, Y(p, K_F)) - X_2(p, K_F), \tag{6}$$

where

$$Y = X_1 + pX_2 + tp^*E_2 - (1 - \tau)rK_F \tag{7}$$

is the national income at domestic prices.

Differentiating (6) totally, we get:

$$dE_2 = \frac{1 + t}{1 + t(1 - m_2)}\Big[\Big(\frac{\partial D_2}{\partial p}\Big| - \frac{\partial X_2}{\partial p}\Big)dp - \frac{m_2}{p}$$

$$\times \{(1 - \tau)K_F dr - rK_F d\tau\} + \Big(\frac{m_2 \tau r}{p} - \frac{\partial X_2}{\partial K_F}\Big)dK_F\Big], \tag{8}$$

where m_2 is the marginal propensity to consume the importable commodity and $(\partial D_2/\partial p|)$ represents the (Slutzky) pure substitution term.

Then we obtain the change in welfare from (5) and (8) as:

$$\frac{dU}{U_1} = \frac{1}{1 + t(1 - m_2)}\Big[tp\Big(\frac{\partial D_2}{\partial p}\Big| - \frac{\partial X_2}{\partial p}\Big)dp$$

$$- (1 + t)(1 - \tau)K_F dr + (1 + t)rK_F d\tau$$

$$+ \{(1 + t)\tau r - tp\frac{\partial X_2}{\partial K_F}\}dK_F\Big]. \tag{9}$$

The following is well known in trade theory:

$$\frac{dr}{dp} = \frac{\partial X_2}{\partial K_F} = \frac{f_2}{k_2 - k_1}, \tag{10}$$

where $f_2 = X_2/L_2$ and $k_i = K_i/L_i$ $(i = 1, 2)$.

Differentiating (1) and using (10), we get:

$$dK_F = \tilde{K}_F'\{\frac{p^*f_2(1-\tau)}{k_2-k_1}dt + r(-d\tau)\}, \qquad (11)$$

since $dp = p^*dt$.

Substituting (10) and (11) into (9) yields:

$$\frac{dU}{U_1} = \frac{1}{1+t(1-m_2)}[tpp^*(\frac{\partial D_2}{\partial p} - \frac{\partial X_2}{\partial p})dt + \frac{(1+t)(1+\xi)r\tilde{K}_F'}{\xi}\{\tau - \frac{1}{1+\xi}(1+\frac{\xi}{r}\frac{tp^*f_2}{k_2-k_1})\} \times \{\frac{p^*f_2(1-\tau)}{k_2-k_1}dt + r(-d\tau)\}], \qquad (12)$$

where $\xi = [(1-\tau)r]\tilde{K}_F'/K_F$, the elasticity of foreign investment with respect to the rental net of the tax on foreign capital.

Suppose that the *increase* in tariff rate and the *decrease* in corporation tax rate induce the same amount of capital inflow, i.e.

$$\tilde{K}_F'\frac{p^*f_2(1-\tau)}{k_2-k_1}dt = \tilde{K}_F'r(-d\tau). \qquad (13)$$

In this case, we can see from (12) that the tariff policy and the tax policy have the same effect on welfare through 'growth' element,

$$\frac{1}{1+t(1-m_2)}\frac{(1+t)(1+\xi)r\tilde{K}_F'}{\xi} \times [\tau - \frac{1}{1+\xi}\{1+\frac{\xi tp^*f_2}{r(k_2-k_1)}\}].$$

Whether this effect is beneficial or not depends upon the initial value of τ. Let us denote

$$\tau^\circ = \frac{1}{1+\xi}\{1+\frac{\xi tp^*f_2}{r(k_2-k_1)}\}.$$

τ° is the optimal tax rate with respect to the tax policy or exogenous capital inflow in the presence of positive tariff on importables. As may be seen, the effect is beneficial (detrimental) if the initial value of τ is larger (smaller) than τ°. In this case where the same amount of capital is induced, (12) shows that the tariff policy must be accompanied with detrimental effects due to consumption and production costs by distorting the prices faced by consumers and producers, respectively, i.e.

$$\frac{tpp^*}{1 + t(1 - m_2)}\left(\frac{\partial D_2}{\partial p}\Big| - \frac{\partial X_2}{\partial p}\right)dt.$$

Then in this case, the tariff policy is necessarily inferior to the tax policy with respect to welfare.

Let us discuss the effect of these policies on protection of the import competing industry.

The change in the output of the importable commodity can be expressed as:

$$\frac{dX_2}{\bar{L}} = \left[- \frac{p^*(l_2 f_1^2 f_1'' + l_1 p^3 f_2^2 f_2'')}{p^3(k_2 - k_1)^2 f_1'' f_2''}\right]dt$$
$$+ \frac{f_2 \tilde{K}_F'}{k_2 - k_1}\left\{\frac{p^* f_2(1 - \tau)}{k_2 - k_1}dt + r(-d\tau)\right\}, \qquad (14)$$

where $\bar{L}$ is the given endowment of labour, $l_i = L_i/\bar{L}$ and $f_i'' = df_i'/dk_i < 0$ ($f_i' = df_i/dk_i$), $i = 1, 2$.

(14) shows that the beneficial first term is peculiar to the tariff policy. Then tariff is superior to corporation tax if they induce the same amount of capital. The first term in (14) is the effect of price change on X_2 along the transformation schedule and the second term is the well-known Rybczynski effect of 'growth', which expands the transformation schedule. Tariff increase policy has these two beneficial elements.

We can summarize our results in this section as follows:

Table 1

Policy rankings when the same amount
of capital is induced

target / policy	welfare	protection
tariff increase	2	1
tax decrease	1	2

Depending upon the policy target which is pursued simultaneously with capital influx, the (most) effective policy instrument must be selected.

4. Tariff and tax for same policy targets

In this section, we investigate which policy requires larger proportionate change in tariff or tax rate to attain the same performance of respective policy object.

Let us begin with capital inflow. From (11), we can see that the same amount of capital is induced if

$$\hat{t} \gtreqless (-\hat{\tau}) \quad \text{as} \quad \tau \gtreqless \frac{1}{1 + \dfrac{r(k_2 - k_1)}{tp^*f_2}}$$

$$= \frac{t\theta_{L1}}{t\theta_{L1} - (1 + t)(\theta_{L2} - \theta_{L1})}, \qquad (15)$$

where θ_{Li} is the distributive share of labour in the ith industry, $\hat{t} = dt/t$ and $\hat{\tau} = d\tau/\tau$. Then, the initial value of corporation tax has an important role in determining the required change in respective policy variables. For convenience, we set the critical value of τ as:

$$\tau^* = \frac{1}{1 + \frac{r(k_2 - k_1)}{tp^* f_2}}.$$

Larger (smaller) proportionate increase in tariff rate is required than proportionate decrease in corporation tax rate when the initial value of τ is larger (smaller) than τ^*.

Now let us turn to the problem of protection. From (14), we see that the same increase in protection is attained if

$$[-\frac{tp^*(l_2 f_1^2 f_1'' + l_1 p^3 f_2^2 f_2'')}{p^3 (k_2 - k_1)^2 f_1'' f_2''} + \frac{f_2 \tilde{K}_F' tp^*(1 - \tau)}{(k_2 - k_1)^2}]\hat{t}$$

$$= \frac{f_2 \tilde{K}_F' \tau r}{k_2 - k_1}(-\hat{\tau}). \tag{16}$$

By the reasoning stated just above, required proportionate change in tariff rate is smaller that proportionate decrease in tax rate when $\tau \leqq \tau^*$. However, a definite relation can not be obtained in the case where $\tau > \tau^*$.

Next we discuss the case where our policy target is welfare. (12) can be rewritten as:

$$\frac{dU}{U_1} = \frac{1}{1 + t(1 - m_2)}[t^2 pp^*(\frac{\partial D_2}{\partial p}| - \frac{\partial X_2}{\partial p})\hat{t}$$

$$+ \frac{(1 + t)(1 + \xi) r \tilde{K}_F'(\tau - \tau^\circ)}{\xi}$$

$$\times \{\frac{tp^* f_2 (1 - \tau)}{k_2 - k_1}\hat{t} + \tau r(-\hat{\tau})\}]. \tag{17}$$

The first term in the bracket is negative. If $\tau \leqq \tau^\circ$ then the home-country welfare can not increase with the aid of either policy. Furthermore, we can not obtain any definite relations between $\hat{t}$ and $(-\hat{\tau})$ to attain the same *decrease* in welfare in this interval of τ.[5] On the other hand, if $\tau > \tau^{\circ}$ the home-country welfare *may* increase. Since $\tau^{\circ} > \tau^{*}$, it can be easily verified that $\hat{t} > (-\hat{\tau})$ to attain the same increase in welfare. This result can be interpreted as follows. As to the 'growth' element, $\hat{t} > (-\hat{\tau})$ in the case where $\tau > \tau^{\circ} > \tau^{*}$. Tariff policy has additional consumption and production distortion elements. Then to offset these detrimental effects on welfare much larger increase in tariff rate is required.

We can summarize our results in this section as follows:

Table 2

Comparison between proportionate changes in tariff and tax for the same policy target

policies \ τ	0 — τ^{*}	τ^{*} — τ°	τ° — 1
same amount of capital inflow	$\hat{t} < (-\hat{\tau})$	$\hat{t} = (-\hat{\tau})$	$\hat{t} > (-\hat{\tau})$
same increase in X_2	$\hat{t} < (-\hat{\tau})$	?	
same change in welfare		?	$\hat{t} > (-\hat{\tau})$

5. The model with sector-specific capital

In the preceeding sections, we employed the standard H-O-S model, where two factors was used in both sectors. However, in some situation, each industry may use its sector-specific inputs, or some factors may take very long time to move inter-industry. Then, in this and following sections, we consider the so-called specific-factor model (whose

5) It should be noted that as $k_2 > k_1$, τ° may be greater than unity. More specifically, τ° is greater than unity if $\xi t p^{*} f_2 / r(k_2 - k_1) > \xi$ or, after rearrangement, if $t > 1/(\sigma - 1)$ where $\sigma = pdr/rdp > 1$. In this case, thus, no definite conclusion on the comparison of the proportionate changes for the same change in welfare is possible.

importance in trade theory is pointed out by Harrod (1957)) formulated by Ikemoto (1969) and Jones (1971).

The model is introduced to analyse international factor movements by Brecher and Findlay (1983) and Srinivasan (1983). The former deals with (1) the effect on national welfare of endogenously determined inflow of foreign capital both for the case of unrestricted international trade and investment and in the presence of a tariff, and (2) the second-best problem of the optimal tax on foreign investment for a given tariff level. The latter examines (1) the interrelation between policies toward commodity trade and toward factor movements, that is, a comparison of the first best optimum with laissez-faire with respect to the equilibrium domestic relative price of imports, the amount of commodity imports and foreign borrowing, (2) the impact of direct foreign investment in the home economy with and without factor market distortions, (3) the effects of emigration of labour from some developing countries and the remittances by these emigrants to their dependants at home, (4) a comparison between the welfare consequences of attracting direct foreign investment and emigration of labour abroad, and (5) the impact of foreign investment in a model with non-traded goods.

As in the preceeding sections, we investigate the performance of an import tariff and a tax on foreign profits for various policy targets in the specific-factor model, and compare the results with those obtained in the H-O-S model. The structure of the model is specified in the following nine equations:

$$X_1 = F^1(\bar{T}, L_1) \qquad (18)$$

$$X_2 = F^2(K, L_2) \qquad (19)$$

$$\bar{L} = L_1 + L_2 \qquad (20)$$

$$K = \bar{K} + K_F \qquad (21)$$

$$r = pF^2_K \quad (= p\partial F^2/\partial K_2) \tag{22}$$

$$w = F^1_L \quad (= \partial F^1/\partial L_1) \tag{23}$$

$$w = pF^2_L \quad (= p\partial F^2/\partial L_2) \tag{24}$$

$$p = (1 + t)p^* \tag{25}$$

$$r(1 - \tau) = r^* \tag{26}$$

where $\bar{T}$ and $\bar{K}$ are the endowments of factors specific to the first and second industries, respectively; K all available factor (capital) specific to the second industry (i.e., sum of $\bar{K}$ and K_F); w and r* the wage rate and the foreign rental. The production side of this economy is also summarized as:

$$dX_1 + pdX_2 - rdK_F = 0. \tag{2}$$

6. The policy which induces the same amount of capital — The specific-factor model

From (22) and (26), we have:

$$r^*/(1 - \tau) = pF^2_K. \tag{27}$$

(23) and (24) yields:

$$F^1_L = pF^2_L. \tag{28}$$

Differentiating (27) and (28) totally, we get:

$$\begin{bmatrix} pF^2_{KK} & pF^2_{KL} \\ pF^2_{LK} & (F^1_{LL} + pF^2_{LL}) \end{bmatrix} \begin{bmatrix} dK \\ dL_2 \end{bmatrix} = \begin{bmatrix} r/(1 - \tau) \\ 0 \end{bmatrix} d\tau + \begin{bmatrix} -p^*F^2_K \\ -p^*F^2_L \end{bmatrix} dt$$

where

$$F^j_{KK} = \frac{\partial F^j_K}{\partial K_j}, \qquad F^j_{LK} = \frac{\partial F^j_L}{\partial K_j}, \qquad (j = 1, 2)$$

and so on. Let

$$A = \begin{bmatrix} pF^2_{KK} & pF^2_{KL} \\ pF^2_{LK} & (F^1_{LL} + pF^2_{LL}) \end{bmatrix},$$

then

$$|A| = pF^2_{KK}(F^1_{LL} + pF^2_{LL}) - p^2(F^2_{KL})^2$$

$$= pF^2_{KK}F^1_{LL} + p^2\{F^2_{KK}F^2_{LL} - (F^2_{KL})^2\}>0 \tag{30}$$

from the concavity assumption of production functions. (29) can be solved as:

$$\begin{bmatrix} dK \\ dL_2 \end{bmatrix} = \begin{bmatrix} \alpha_{11}d\tau + \alpha_{12}dt \\ \alpha_{21}d\tau + \alpha_{22}dt \end{bmatrix}, \tag{31}$$

where

$$\alpha_{11} = \frac{r(F^1_{LL} + pF^2_{LL})}{(1 - \tau)|A|}<0$$

$$\alpha_{21} = \frac{-prF^2_{LK}}{(1 - \tau)|A|}<0$$

$$\alpha_{12} = -\{p^*F^2_K(F^1_{LL} + pF^2_{LL}) - pp^*F^2_LF^2_{KL}\}/|A|>0$$

$$\alpha_{22} = \frac{p^*(rF^2_{LK} - wF^2_{KK})}{|A|}>0.$$

Other variables also can be solved from (18), (19), (20), (21), (23), (25), (26) and (31) as:

$$dL_1 = -dL_2 = -(\alpha_{21}d\tau + \alpha_{22}dt) \tag{32}$$

$$dK_F = dK = \alpha_{11}d\tau + \alpha_{12}dt \tag{33}$$

$$dw = F^1_{LL}dL_1 = -F^1_{LL}(\alpha_{21}d\tau + \alpha_{22}dt) \tag{34}$$

$$dr = \frac{r}{1-\tau}d\tau \tag{35}$$

$$dp = p^*dt \tag{36}$$

$$dX_1 = F^1_L dL_1 = -F^1_L(\alpha_{21}d\tau + \alpha_{22}dt) \tag{37}$$

$$\begin{aligned} dX_2 &= F^2_K dK + F^2_L dL_2 \\ &= (F^2_K\alpha_{11} + F^2_L\alpha_{21})d\tau + (F^2_K\alpha_{12} + F^2_L\alpha_{22})dt \end{aligned} \tag{38}$$

Substituting dp, dr and dK_F into (9) yields:

$$\begin{aligned} \frac{dU}{U_1} = \frac{1}{1 + t(1 - m_2)}&[\{tpp^*\frac{\partial D_2}{\partial p}| \\ &- tp(F^2_K\alpha_{12} + F^2_L\alpha_{22}) + (1 + t)\tau r\alpha_{12}\}dt \\ &- \{tp(F_K\alpha_{11} + F_L\alpha_{21}) - (1 + t)\tau r\alpha_{11}\}d\tau]. \end{aligned} \tag{39}$$

Let us assume that two policies (small increase in a tariff rate and small decrease in a tax rate) induce the same amount of foreign capital. Since

$$\alpha_{12}dt = \alpha_{11}d\tau \tag{40}$$

in this case, the change in welfare may be expressed as:

$$\frac{dU}{U_l} = \frac{tpp^*\frac{\partial D_2}{\partial p}|dt - r[\{t-(1+t)\tau\}\alpha_{11} + t\alpha_{11}]d\tau}{1+t(1-m_2)}$$

$$-\frac{r[\{t-(1+t)\tau\}\alpha_{12} + t\alpha_{22}]dt}{1+t(1-m_2)}$$

$$= \frac{tpp^*\frac{\partial D_2}{\partial p}|dt - rt(\alpha_{21}d\tau + \alpha_{22}dt)}{1+t(1-m_2)}. \tag{41}$$

(41) shows that when the same amount of capital is induced the tax policy in necessarily superior to the tariff policy with respect to *welfare* since (i) the tariff policy involves a detrimental consumption effect,

$$\frac{tpp^*\frac{\partial D_2}{\partial p}|dt}{1+t(1-m_2)} < 0,$$

and (ii) the relation

$$\frac{-tr\alpha_{22}dt}{1+t(1-m_2)} < \frac{-tr\alpha_{21}d\tau}{1+t(1-m_2)} < 0 \tag{43}$$

holds.[6] Since $\alpha_{21}d\tau$ and $\alpha_{22}dt$ are related to dX_2 due to $d\tau$ and dt *via* the change in L_2 (see (38)), (43) implies that a detrimental effect of the tariff policy *via* L_2 (i.e., the costs of increase in the production of the inefficient importable commodity) is larger than that of the tax policy.

Now we investigate the effect of the policies which induces the same amount of foreign capital on protection of the import competing sector. The change in X_2 is expressed as:

$$dX_2 = F^2_K(\alpha_{11}d\tau + \alpha_{12}dt) + F^2_L(\alpha_{21}d\tau + \alpha_{22}dt). \tag{38'}$$

6) The proof is given in the Appendix.

In our present setting, i.e., $\alpha_{11}d\tau = \alpha_{12}dt$, (38′) shows that the tariff policy is superior to the tax policy with respect to *protection* since

$$\alpha_{21}d\tau < \alpha_{22}dt$$

as explained in the discussion on welfare just below (43). Therefore our results in this section confirms the results obtained in the H-O-S model.

7. Concluding remarks

We raise and analyze a question relating to developing strategies of a country in a two types of trade models. If an economy which is imposing a tariff on imported goods and a corporation tax on foreign capital wishes to introduce more foreign capital, is tariff increase or tax drop more effective in protection or more beneficial (or less harmfull) to welfare? We also compare the proportionate changes of tariff and tax to achieve different goals of the economy.

Our main messages in this paper are that within the H-O-S model (i) tariff increase is superior to corporation tax decrease in respect to protection when we consider the policy to induce the same amount of capital, conversely (ii) corporation tax decrease is superior to tariff increase in respect to welfare, and (iii) which policy is more effective to attain the respective goal depends upon the initial level of corporation tax, as details being listed in Tables 1 and 2. Furthermore, the results (i) and (ii) are confirmed also within the specific-factor model.

Appendix

In this appendix, we show the assertion (43) in the main text. It suffice to prove that

$$\alpha_{21}d\tau < \alpha_{22}dt.$$

By definitions of α_{21} and α_{22}, we can see

$$\alpha_{21}d\tau - \alpha_{22}dt.$$

$$= [-\frac{prF^2_{LK}}{1-\tau}d\tau - p^*(rF^2_{LK} - wF^2_{KK})dt]/|A|$$

$$= [-prF^2_{LK}(\frac{d\tau}{1-\tau} + \frac{dt}{1+t}) + p^*wF^2_{KK}dt]/|A|$$

$$= \{-\frac{pp^*w(F^2_{LK})^2}{F^1_{LL} + pF^2_{LL}} + p^*wF^2_{KK}\}dt/|A|$$

since

$$d\tau = \frac{\alpha_{12}}{\alpha_{11}}dt = \frac{-(1-\tau)\{p^*F^2_K(F^1_{LL} + pF^2_{LL}) - p^*wF^2_{KL}\}}{r(F^1_{LL} + pF^2_{LL})}.$$

The relation

$$F^2_{KK}K + F^2_{KL}L_2 = 0$$

holds since $F^2_K = F^2_K(K, L_2)$ is homogeneous of degree zero with respect to K and L_2. Then, we have:

$$\alpha_{21}d\tau - \alpha_{22}dt$$

$$= \frac{-p^*w}{(F^1_{LL} + pF^2_{LL})|A|}\{p(F^2_{LK})^2 - F^2_{KK}(F^1_{LL} + pF^2_{LL})\}dt$$

$$= \frac{p^*w}{(F^1_{LL} + pF^2_{LL})|A|}[p\{F^2_{KK}F^2_{LL} - (F^2_{LK})^2\} + F^1_{LL}F^2_{KK}]dt < 0$$

for $dt > 0$.

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